

METHOD OF FORMING LOW-RESISTIVITY TUNGSTEN INTERCONNECTS

ABSTRACT

5 Methods and apparatus for preparing a low-resistivity tungsten film on a substrate are
provided. Methods involve the formation of a tungsten nucleation layer on a substrate using
pulsed nucleation layer (PNL) techniques and depositing a bulk tungsten layer thereon.
Methods for forming the tungsten nucleation layer involve the use of a boron-containing
species, a tungsten-containing precursor, and optionally, a silane. The methods described
10 are particularly useful for applications where thin, low resistivity films are desired, such as
interconnect applications.